

SEQUENCE LISTING

<110> The Government of the United States of America, as represented by the Secretary of the Department of Health and Human Services, Centers for Disease Control and Prevention

Lal, Altaf A.

Ping Shi, Ya

Hasnain, Seyed E.

<120> Recombinant Multivalent Malarial Vaccine Against Plasmodium Falciparum

<130> 6395-57049

<140> 09/763,397

<141> 2001-02-16

<150> US 60/097,703

<151> 1998-08-21

<150> PCT / US99/18869

<151> 1999-08-19

<160> 26

<170> PatentIn version 3.1

<210> 1

<211> 1053

<212> DNA

<213> Artificial Sequence

<220>

<223> Recombinant DNA/Protein

<220>

<221> CDS

<222> (1)..(1053)

<223>

<400> 1

atg	aaa	ttc	tta	gtc	aac	gtt	gcc	ctt	gtt	ttt	atg	gtc	gtg	tac	att	48
Met	Lys	Phe	Leu	Val	Asn	Val	Ala	Leu	Val	Phe	Met	Val	Val	Tyr	Ile	
1			5						10					15		

tct	tac	atc	tat	gcg	gat	cat	cat	cat	cat	cat	cat	aaa	cat	aaa	aaa	96
Ser	Tyr	Ile	Tyr	Ala	Asp	His	His	His	His	His	His	Lys	His	Lys	Lys	
			20					25						30		

tta	aag	caa	cca	ggg	gat	ggt	aat	cct	tggtcc	cca	tgt	agt	gta	act	144	
Leu	Lys	Gln	Pro	Gly	Asp	Gly	Asn	Pro	Trp	Ser	Pro	Cys	Ser	Val	Thr	
		35					40					45				

tgt	gga	aaa	cct	aaa	gac	gaa	tta	gat	tat	gaa	aat	gat	att	gaa	aaa	192
Cys	Gly	Lys	Pro	Lys	Asp	Glu	Leu	Asp	Tyr	Glu	Asn	Asp	Ile	Glu	Lys	
	50					55					60					

aaa	att	tgt	aaa	atg	gaa	aaa	tgt	tcc	agt	gtg	ttt	aat	gtc	gta	aat	240
Lys	Ile	Cys	Lys	Met	Glu	Lys	Cys	Ser	Ser	Val	Phe	Asn	Val	Val	Asn	
65						70					75				80	

agt aat tct gga tgt ttc aga cat tta gat gaa aga gaa gaa tgt aaa	288
Ser Asn Ser Gly Cys Phe Arg His Leu Asp Glu Arg Glu Glu Cys Lys	
85 90 95	
tgt tta tta gaa gat tca ggt agc aac gga aag aaa atc aca tgt gaa	336
Cys Leu Leu Glu Asp Ser Gly Ser Asn Gly Lys Lys Ile Thr Cys Glu	
100 105 110	
tgt act aaa cct gat tct aag cct att gtg caa tat gac aat ttc aat	384
Cys Thr Lys Pro Asp Ser Lys Pro Ile Val Gln Tyr Asp Asn Phe Asn	
115 120 125	
gca aac cca aac gca aac ccc aat gca aat cct gat gga aat tgt gaa	432
Ala Asn Pro Asn Ala Asn Pro Asn Ala Asn Pro Asp Gly Asn Cys Glu	
130 135 140	
gat ata cca cat gta aat gaa ttt tca gca att gat ctt gga aat gct	480
Asp Ile Pro His Val Asn Glu Phe Ser Ala Ile Asp Leu Gly Asn Ala	
145 150 155 160	
gaa aaa tat gat aaa atg gat gaa cca caa cat tat ggg aaa tca ctc	528
Glu Lys Tyr Asp Lys Met Asp Glu Pro Gln His Tyr Gly Lys Ser Leu	
165 170 175	
act cca tta gaa gaa tta tat aaa cca aat gat aaa agt ttg tat cag	576
Thr Pro Leu Glu Glu Leu Tyr Lys Pro Asn Asp Lys Ser Leu Tyr Gln	
180 185 190	
tat ata aaa gca aat tct aaa ttt ata ggt ata act gaa cta agc aac	624
Tyr Ile Lys Ala Asn Ser Lys Phe Ile Gly Ile Thr Glu Leu Ser Asn	
195 200 205	
aca ttc ata aac aat gct gga caa cat gga cat atg cat ggt aac gag	672
Thr Phe Ile Asn Asn Ala Gly Gln His Gly His Met His Gly Asn Glu	
210 215 220	
agg gaa gat gag aga acg ctt act aag gaa tat gaa gat att gtt ttg	720
Arg Glu Asp Glu Arg Thr Leu Thr Lys Glu Tyr Glu Asp Ile Val Leu	
225 230 235 240	
aaa gag ttt aca tat atg ata aac ttt gga aga gga cag aat tat tgg	768
Lys Glu Phe Thr Tyr Met Ile Asn Phe Gly Arg Gly Gln Asn Tyr Trp	
245 250 255	
gaa cat cca tat caa aaa agt gat caa cct aaa caa tat gaa caa cat	816
Glu His Pro Tyr Gln Lys Ser Asp Gln Pro Lys Gln Tyr Glu Gln His	
260 265 270	
tta aca gat tat gaa aaa att aaa gaa ggt aag ccc ttg gat aaa ttt	864
Leu Thr Asp Tyr Glu Lys Ile Lys Glu Gly Lys Pro Leu Asp Lys Phe	
275 280 285	
gga aat atc tat gat tat cac tat gag cat tct agt cca tct agt aca	912
Gly Asn Ile Tyr Asp Tyr His Tyr Glu His Ser Ser Pro Ser Ser Thr	
290 295 300	
aag tca tca agt cca tca aat gta aaa tca gct agt cta gct aca aga	960
Lys Ser Ser Ser Pro Ser Asn Val Lys Ser Ala Ser Leu Ala Thr Arg	
305 310 315 320	

tta atg aaa aaa ttt aaa gct gaa atc aga gat ttc ttc ggt ata agt 1008
 Leu Met Lys Lys Phe Lys Ala Glu Ile Arg Asp Phe Phe Gly Ile Ser
 325 330 335

tat tat gaa aag gtt tta gcg aaa tat aag gat gat tta gaa tag 1053
 Tyr Tyr Glu Lys Val Leu Ala Lys Tyr Lys Asp Asp Leu Glu
 340 345 350

<210> 2
 <211> 350
 <212> PRT
 <213> Artificial Sequence

<220>
 <223> Recombinant DNA/Protein

<400> 2

Met Lys Phe Leu Val Asn Val Ala Leu Val Phe Met Val Val Tyr Ile
 1 5 10 15

Ser Tyr Ile Tyr Ala Asp His His His His His His Lys His Lys Lys
 20 25 30

Leu Lys Gln Pro Gly Asp Gly Asn Pro Trp Ser Pro Cys Ser Val Thr
 35 40 45

Cys Gly Lys Pro Lys Asp Glu Leu Asp Tyr Glu Asn Asp Ile Glu Lys
 50 55 60

Lys Ile Cys Lys Met Glu Lys Cys Ser Ser Val Phe Asn Val Val Asn
 65 70 75 80

Ser Asn Ser Gly Cys Phe Arg His Leu Asp Glu Arg Glu Glu Cys Lys
 85 90 95

Cys Leu Leu Glu Asp Ser Gly Ser Asn Gly Lys Lys Ile Thr Cys Glu
 100 105 110

Cys Thr Lys Pro Asp Ser Lys Pro Ile Val Gln Tyr Asp Asn Phe Asn
 115 120 125

Ala Asn Pro Asn Ala Asn Pro Asn Ala Asn Pro Asp Gly Asn Cys Glu
 130 135 140

Asp Ile Pro His Val Asn Glu Phe Ser Ala Ile Asp Leu Gly Asn Ala
 145 150 155 160

Glu Lys Tyr Asp Lys Met Asp Glu Pro Gln His Tyr Gly Lys Ser Leu
 165 170 175

Thr Pro Leu Glu Glu Leu Tyr Lys Pro Asn Asp Lys Ser Leu Tyr Gln
180 185 190

Tyr Ile Lys Ala Asn Ser Lys Phe Ile Gly Ile Thr Glu Leu Ser Asn
195 200 205

Thr Phe Ile Asn Asn Ala Gly Gln His Gly His Met His Gly Asn Glu
210 215 220

Arg Glu Asp Glu Arg Thr Leu Thr Lys Glu Tyr Glu Asp Ile Val Leu
225 230 235 240

Lys Glu Phe Thr Tyr Met Ile Asn Phe Gly Arg Gly Gln Asn Tyr Trp
245 250 255

Glu His Pro Tyr Gln Lys Ser Asp Gln Pro Lys Gln Tyr Glu Gln His
260 265 270

Leu Thr Asp Tyr Glu Lys Ile Lys Glu Gly Lys Pro Leu Asp Lys Phe
275 280 285

Gly Asn Ile Tyr Asp Tyr His Tyr Glu His Ser Ser Pro Ser Ser Thr
290 295 300

Lys Ser Ser Ser Pro Ser Asn Val Lys Ser Ala Ser Leu Ala Thr Arg
305 310 315 320

Leu Met Lys Lys Phe Lys Ala Glu Ile Arg Asp Phe Phe Gly Ile Ser
325 330 335

Tyr Tyr Glu Lys Val Leu Ala Lys Tyr Lys Asp Asp Leu Glu
340 345 350

<210> 3
<211> 16
<212> PRT
<213> Plasmodium falciparum

<400> 3

Lys Pro Leu Asp Lys Phe Gly Asn Ile Tyr Asp Tyr His Tyr Glu His
1 5 10 15

<210> 4
<211> 12
<212> PRT
<213> Plasmodium falciparum

<400> 4

Asn Ala Asn Pro Asn Ala Asn Pro Asn Ala Asn Pro
1 5 10

<210> 5

<211> 13

<212> PRT

<213> Plasmodium falciparum

<400> 5

Lys His Lys Lys Leu Lys Gln Pro Gly Asp Gly Asn Pro
1 5 10

<210> 6

<211> 23

<212> PRT

<213> Plasmodium falciparum

<400> 6

Lys Pro Lys Asp Glu Leu Asp Tyr Glu Asn Asp Ile Glu Lys Lys Ile
1 5 10 15

Cys Lys Met Glu Lys Cys Ser
20

<210> 7

<211> 21

<212> PRT

<213> Plasmodium falciparum

<400> 7

Asp Ile Glu Lys Lys Ile Cys Lys Met Glu Lys Cys Ser Ser Val Phe
1 5 10 15

Asn Val Val Asn Ser
20

<210> 8

<211> 9

<212> PRT

<213> Plasmodium falciparum

<400> 8

Trp Ser Pro Cys Ser Val Thr Cys Gly
1 5

<210> 9

<211> 9

<212> PRT
<213> Plasmodium falciparum

<400> 9

Lys Pro Ile Val Gln Tyr Asp Asn Phe
1 5

<210> 10
<211> 8
<212> PRT
<213> Plasmodium falciparum

<400> 10

Lys Pro Asn Asp Lys Ser Leu Tyr
1 5

<210> 11
<211> 18
<212> PRT
<213> Plasmodium falciparum

<400> 11

Asn Ser Gly Cys Phe Arg His Leu Asp Glu Arg Glu Glu Cys Lys Cys
1 5 10 15

Leu Leu

<210> 12
<211> 19
<212> PRT
<213> Plasmodium falciparum

<400> 12

Glu Asp Ser Gly Ser Asn Gly Lys Lys Ile Thr Cys Glu Cys Thr Lys
1 5 10 15

Pro Asp Ser

<210> 13
<211> 17
<212> PRT
<213> Plasmodium falciparum

<400> 13

Gly Ile Ser Tyr Tyr Glu Lys Val Leu Ala Lys Tyr Lys Asp Asp Leu
1 5 10 15

Glu

<210> 14
<211> 8
<212> PRT
<213> Plasmodium falciparum

<400> 14

Ser Asn Thr Phe Ile Asn Asn Ala
1 5

<210> 15
<211> 8
<212> PRT
<213> Plasmodium falciparum

<400> 15

Gly Gln His Gly His Met His Gly
1 5

<210> 16
<211> 18
<212> PRT
<213> Plasmodium falciparum

<400> 16

Asp Gly Asn Cys Glu Asp Ile Pro His Val Asn Glu Phe Ser Ala Ile
1 5 10 15

Asp Leu

<210> 17
<211> 18
<212> PRT
<213> Plasmodium falciparum

<400> 17

Gly Asn Ala Glu Lys Tyr Asp Lys Met Asp Glu Pro Gln His Tyr Gly
1 5 10 15

Lys Ser

<210> 18
<211> 19
<212> PRT
<213> Plasmodium falciparum

<400> 18

Asp Gln Pro Lys Gln Tyr Glu Gln His Leu Thr Asp Tyr Glu Lys Ile
1 5 10 15

Lys Glu Gly

<210> 19

<211> 22

<212> PRT

<213> Plasmodium falciparum

<400> 19

Glu Phe Thr Tyr Met Ile Asn Phe Gly Arg Gly Gln Asn Tyr Trp Glu
1 5 10 15

His Pro Tyr Gln Lys Ser
20

<210> 20

<211> 19

<212> PRT

<213> Plasmodium falciparum

<400> 20

Asn Glu Arg Glu Asp Glu Arg Thr Leu Thr Lys Glu Tyr Glu Asp Ile
1 5 10 15

Val Leu Lys

<210> 21

<211> 8

<212> PRT

<213> Plasmodium falciparum

<400> 21

Leu Thr Pro Leu Glu Glu Leu Tyr
1 5

<210> 22

<211> 17

<212> PRT

<213> Plasmodium falciparum

<400> 22

Ser Ser Pro Ser Ser Thr Lys Ser Ser Pro Ser Asn Val Lys Ser Ala
1 5 10 15

Ser

<210> 23
<211> 17
<212> PRT
<213> Plasmodium falciparum

<400> 23

Leu Ala Thr Arg Leu Met Lys Lys Phe Lys Ala Glu Ile Arg Asp Phe
1 5 10 15

Phe

<210> 24
<211> 15
<212> PRT
<213> Plasmodium falciparum

<400> 24

Gln Tyr Ile Lys Ala Asn Ser Lys Phe Ile Gly Ile Thr Glu Leu
1 5 10 15

<210> 25
<211> 22
<212> PRT
<213> Honey bee

<400> 25

Met Lys Phe Leu Val Asn Val Ala Leu Val Phe Met Val Val Tyr Ile
1 5 10 15

Ser Tyr Ile Tyr Ala Asp
20

<210> 26
<211> 6
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic

<400> 26

His His His His His His
1 5